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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

Project h-1-4 Date March 31, 1939 Author Donald De Leon

Biology and control of the Black Hills beetle
(Dendroctonus ponderosae Hopk.)

TITLE

OFFICE MEMORANDUM

LIST OF FAUNA ASSOCIATED WITH THE BLACK HILLS BEETLE IN PONDEROSA, LODGEPOLE, AND LIMBER PINE

Forest Insect Laboratory,
Fort Collins, Colorado

SUBJECT—

INDEX NO.—

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By

Donald De Leon

Forest Insect Laboratory,

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March 31, 1939.

LIST OF FAUNA ASSOCIATED WITH THE BLACK HILLS BEETLE IN PONDEROSA, LODGEPOLE, AND LIMBER PINE

Although some specimens of insects associated with the Black Hills beetle remain to be determined, it seems advisable to bring up-to-date the records in the files. This list is a record of the fauna found associated with the Black Hills beetle not only during the period the tree is infested by the beetle but also as far back as collection records are available. This is done because some insects may take two or more years to develop, while others may not enter the tree until the Black Hills beetle brood is well developed.

Practically all the insects listed here were collected from the tree cages (fig. 1) used during the past four years in course of a study on the Black Hills beetle. These cages were erected the spring following the attack of the beetle and collections made from them two or three times a week during that season and generally about once or twice a week the season following the emergence of the brood. In some cases the cages were left on and collected from the third season.

Without doubt some predators but chiefly parasites are excluded from the areas covered by the cages. It is believed, however, that the figures on the number of parasites and predators collected in the cages do give a general idea of their abundance and importance.

Hopkins U. S. numbers are given where they have already been assigned to a particular species, whether or not determinations have been received. If the name used is an official determination either the author is given, or, if only a generic determination, "sp." follows the genus. Where Hopkins numbers have not yet been assigned, the field collection number is given; the symbols showing the locality of collection are as follows: MK--Mah Keeney Park, Evergreen, Colo.; NSV--North St. Vrain Canyon, Estes Park, Colo.; and EM--Elk Mountain, Saratoga, Wyoming. The year of collection and locality are also shown by the Hopkins numbers as follows:

1937	1938
31501 Ponderosa pine (MK)	31544 ponderosa pine (NSV)
31507 limber pine (EM)	31546 " " (MK)
31508 Lodgepole pine (EM)	31547 limber pine (EM)
	31548 lodgepole pine (EM)

Following this list is a table showing the abundance of the more common parasites and predators and the other associated insects collected from the tree cages. During the past four years, as is shown by the table, a total of 23,166 specimens other than the Black Hills beetle were collected from these cages on the three host trees, identified to species where possible, and their abundance recorded.

Sixteen orders, 109 families and somewhat over 300 different species of which about 90 are represented by a single specimen go to make up this number.

NEMAS

"Aphelencoides". This nematode was collected Oct. 28, 1938 from ponderosa pine attacked in August 1938. Slabs infested with the Black Hills beetle from the Black Hills were examined the same month but no nemas could be found. It seems probable that any present died from excessive drying out of the lot. (Hopk.U.S. 31533).

CHILOPODA

Family ?

Cnathomerum xenoporus (Chamb.). This geophilid was collected early in September from ponderosa pine attacked the year previous. (Hopk.U.S. 31501-P-23).

Another undetermined species was collected from limber pine. (144a EM).

DIPLOPODA

Julidae

Genus? sp.? An undeterminable juvenile emerged from a ponderosa pine in mid-August. (Hopk.U.S. 31501-P-23). In 1938 they were not uncommon--a total of 28 specimens emerging from 8 out of 12 caged trees. Most of them were collected during the latter part of August and September. (34 NSV).

Parajulus sp. probably undescribed. The specimens were collected from a lodgepole pine attacked the year before. (Hopk.U.S. 31508-U-13).

The diplopods and chilopods most probably gained entrance into the cages via beetle exit holes and egg galleries. Since most of them were collected in September it does not seem likely that they crawled under the bark to hibernate.

PSEUDOSCORPIONIDA

Cheliferidae

Chelifer? Pseudoscorpions were collected from all three host trees both one and two years after they were attacked by the Black Hills beetle. They were not very common. (Hopk.U.S. 31501-P-5, 31508-U-15; 17 NSV).

Parachelifer n. sp.
det J.C. Chamberlin
see letter of April 23/41
to Beneley.

PHALANGIDA

Family?

Hadrobunus sp. A single specimen was collected from ponderosa pine the first year after it was attacked. (Hopk.U.S. 31501-O-7).

ARANEIDA

Numerous spiders have been collected from all three host trees during the past three years. As with Hadrobunus it is unlikely that they are attracted to the infested trees; it is more probable that they are present under bark scales or in bark crevices when the cages are placed on the trees and also that they crawl through the wire when very small. The determinations received to date are listed below:

Species	Hopk.U.S.# or Col. #	Hopk.U.S.# or Col. #
Steatoda borealis Hz.	31501-0-14	
Xysticus sp.	31501-0-6	30e EM
	31501-0-9	41 EM
	31501-0-10e	
	26 NSV	
Herpyllus sp.	31501-0-3	
	31501-0-4	
	31501-0-5	
	31501-0-5a	
	168 WK	
	64 NSV	
Phidippus sp.	31501-0-11	
	45b NSV	
Linyphia sp.	31501-0-12	
Clubiona sp.	31501-0-2	
Haplodrassus sp.	31501-0-13	
Oecobius sp.	31501-0-1	
	31501-0-7a	
Dictyna sp.	31501-0-8	
Sp.	31501-0-11	30 EM
Sp.	12 WK	42 EM
Sp.	12 1 WK	51 EM
Sp.	12 s WK	69 EM
Sp.	178 WK	78 EM
Sp.	45 NSV	97 EM
Sp.	45a,c,d,& e NSV	101 EM
Sp.	64e NSV	142 EM
Sp.		151 EM
Sp.		171 EM

ACARIDA

Uropodidae

An undeterminable nymph was secured from ponderosa pine in 1937. (Hopk.U.S. 31501-Q-3).

Various additional species of mites were collected from the cages on all three host trees but none has yet been determined. (Hopk.U.S. 31501-P-6, 31507-U-11, 31508-U-18).

COLLEMBOLA

Family ?

Collembolids were secured from all three host trees. Several species seem to be present. None has yet been determined. (Hopk. U.S. 31501-P-3, 31507-U-26; 8 NSV, 35 EM, 126 WK).

CORRODENTIA

Psocidae

Psocus oregonus Banks was collected from a lodgepole pine attacked the year previous. (Hopk.U.S. 31508-U-33).

Psocus stristus Walker was collected from a ponderosa pine attacked the year before. (Hopk.U.S. 31501-P-14).

Additional undetermined corrodentia from ponderosa pine are under the number 21 NSV.

Atropidae

Myrmicodipnella sp.? was collected from the same tree at the same time as was P. stristus Walk. (Hopk.U.S. 31501-P-14).

Hyperetes sp. emerged from lodgepole pine attacked the year previous. (Hopk.U.S. 31508-U-33).

NEUROPTERA

Raphidiidae

Raphidia sp.? Larvae have been reared from ponderosa pine and limber pine. They are never abundant. (Hopk.U.S. 31507-U-8; 19 NSV, 107, 65 WK).

Chrysopidae

Chrysopa sp.? A single larval specimen was secured from limber pine, and from ponderosa pine the same year. (Hopk.U.S. 31507-U-16; 120 WK).

Coniopterigidae

Conwentzia sp. A single specimen was secured from ponderosa pine, in 1937, and what appears to be the same insect, in 1938, from trees dead two years. Specimens belonging to this family were also secured from limber pine. (Hopk.U.S. 31501-K-18, 31507-U-1; 165a WK). More material in this family is desired in Washington.

Hemerobiidae

Hemerobius pacificus Banks was secured in August 1937 from a limber pine attacked in 1936. (Hopk.U.S. 31507-T-27).

THYSANOPTERA

Phleothripidae

Phleothrips (Hoplandrothrips) sp. A specimen was determined from material from lodgepole pine. (Hopk.U.S. 31508-U-11).

Hoplothrips sp. A specimen was secured from a ponderosa pine. (Hopk.U.S. 31501-Q-9).

Thripidae

Frankliniella sp. This species was collected from lodgepole pine at the same time as was Phleothrips sp. (Hopk.U.S. 31508-U-11).

It does not seem likely that these insects are attracted to infested trees. It is possible that they crawled through the wire mesh and fell into the collection jars. (There is an error in transmitting some of the determinations for the number given for them (31508-U-11) covers certain cerambycid larvae.)

HOMOPTERA

Cercopidae

Clastoptera arborina Ball. Two specimens were secured, one from lodgepole pine and one from limber pine attacked the year before. (Hopk.U.S. 31508-T-37, 31507-T-26).

Cicadellidae

Nesosteles neglectus (DeL.& D.). A single specimen was collected from a lodgepole pine attacked three years earlier. (Hopk. U.S. 31508-T-39; 42 WK re a nymph).

Psyllidae

Arytaina ribesiae Crawf. Two specimens were secured from limber pine, both from trees attacked the year previous. Another specimen that appears to be this species was collected from ponderosa pine. (Hopk.U.S. 31507-T-28, 31544-V).

Aphididae

Aphids were collected from all three host trees. No determinations have yet been secured for any of them. (HopkU.S. 31501-P-16, 31507-U-20, 31508-U-17; 19 WK, 33 WK, 37 WK, 18 NSV, 79 WK).

HEMIPTERA

Aradidae

Aradus n.sp. near marginatus Uhl. Several specimens were collected from the ponderosa pine cages. (Hopk.U.S. 31501-J-2).

Aradus n.sp. near ornatus Uhl. A single specimen was secured from ponderosa pine. (Hopk.U.S. 31501-J-3).

Aradus parvicornis Parsh. Several specimens were secured from the ponderosa pine cages. (Hopk.U.S. 31501-J-1 -J-2, 31544-A-2, 31546-A).

Aradus sp. Several species as yet undetermined were secured from ponderosa pine tree cages from trees attacked both one and two years earlier. (Hopk.U.S. 31544-A, 31544-A-1, 31544-A-3 to 6 incl., 31546-A-1, 31549-A; 59 NSV). It is interesting to note that no Aradus were collected from the lodgepole or the limber pine cages.

Miridae

Deraeocoris barberi Kngt. A single specimen was collected from ponderosa pine. (Hopk.U.S. 31501-J-6).

Deraeocoris brevis (Uhl.). A single specimen of this species was collected under the same conditions as for D. barberi Kngt. (Hopk.U.S. 31501-J-7).

Deraeocoris sp. Two undetermined species were collected from a ponderosa pine attacked the year previous and from limber pine attacked two years earlier. (Hopk.U.S. 31544-D, 31547-C).

Stenodema virens (L.). A single specimen was collected from a limber pine dead one year. (Hopk.U.S. 31507-S-38).

Sp.? Hopk.U.S. 31544-E

Anthocoridae

Lyctocoris campestris (F.). This species is a representative of probably the most common genus of bugs generally associated with bark beetles. It was collected from all three host trees. (Hopk. U.S.31501-J-4, 31507-S-37, 31508-S-35, 31544-C, 31547-B).

Anthocoris musculus (Say). A single specimen was secured from ponderosa pine. (Hopk.U.S. 31501-J-9).

Nabidae

Nabis alternatus Parsh. Only a single specimen was secured from lodgepole pine attacked the year previous. It is doubtful that it is attracted to beetle-infested trees. (Hopk.U.S. 31508-S-37).

Piesmidae

Piesma cinerea (Say). A single specimen was secured from ponderosa pine. (Hopk.U.S. 31501-J-10).

Tingidae

Hopk.U.S. 31547-O; 30b EM.

Lygaeidae

Eremocoris ferus (Say). Specimens were secured from lodgepole and limber pines attacked the year previous and from trees dead two years. (Hopk.U.S. 31507-S-36, 31507-S-37, 31508-S-34, 31544-B-1, 31547-A, 31548-A).

Eremocoris n. sp. near obscurus V.D. A single specimen was secured from ponderosa pine (Hopk.U.S. 31501-J-5).

Eremocoris sp. What appears to be the same species as E. ferus was secured from ponderosa pine. (Hopk.U.S. 31544-B-2).

Nysius ericeae (Schill.). Material was reared in 1937 from lodgepole pine attacked in 1936, and in 1938 from lodgepole pine attacked two years earlier. A variety was collected from limber pine in 1937. (Hopk.U.S. 31507-S-37, 31508-S-36, 31547-D, 31548-B).

Geocoris bullatus (Say). A single specimen was secured in 1937 from ponderosa pine. (Hopk.U.S. 31501-J-8).

An undetermined specimen is under Hopk.U.S. 31547-E.

Of the Hemiptera listed here it is possible that only four genera, Aradus, Eremocoris, Dermacocoris, and Lyctocoris are attracted to the beetle-infested trees but it is believed that they are attracted to the trees because of the change in conditions caused by the Black Hills beetle and not because they are predacious on the Black Hills beetle.

COLEOPTERA

Carabidae

Dromiini. Larvae belonging to this tribe were collected from limber pine and lodgepole pine. (Hopk.U.S. 31507-U-3 and 31508-U-16).

"Bembidium". An adult was taken from a ponderosa pine dead two years, (177 WK).

Silphidae

Agathidium concinnum Mann.? Three adults were collected from limber pine attacked the year previous and a single adult from lodgepole pine killed two years previous. (Hopk.U.S. 31507-F, 31508-F, and 31547-K-3).

Orthoperidae

Molamba sp. A single adult was secured from ponderosa pine. What appears to be the same species was secured from lodgepole pine attacked two years previous. (Hopk.U.S. 31501-N-7, 31544-S-4, 31547-K-7, 31548-K-1; 22b EM).

Staphylinidae

Omaliinae. Larvae of this subfamily were secured from all three host trees. (Hopk.U.S. 31507-U-14, 31508-U-34 -35b). Adults were secured chiefly from ponderosa pine but no generic determination could be made from the material collected. (Hopk.U.S. 31501-M-6, -M-7, -M-9, 31501-P-25, -25b-d).

Tachyporinae. Mycetoporus sp. A single specimen was reared from ponderosa pine in 1937 (Hopk.U.S. 31501-M-10).

Aleocharinae. Several representatives of this subfamily were secured in the larval stage from ponderosa, limber, and lodgepole pine attacked the same year or one or two years earlier (Hopk.U.S. 31501-26a and b, 31501-27a-d, 31507-U-21 and 31508-U-12b). In addition larvae definitely known to be Cyrophaena sp. were secured from lodgepole pine. (Hopk.U.S. 31508-U-12a and U-30). Adults belonging to this subfamily were secured from ponderosa pine (Hopk. U.S. 31501-M-5, 31501-P-22 -P-26a-b, -27a-d).

Staphylininae. Nudobius sp. A single larve of this genus was secured in 1937 from both lodgepole pine and ponderosa pine attacked in 1936. (Hopk.U.S. 31508-U-2, 31508-U-5; 17a WK).

Nudobius cephalus (Say). This is a fairly common species having been reared from all three host trees. (Hopk.U.S. 31501-M-4, 31507-E, 31508-E, 31547-L-2).

Atheta sp. An adult that probably belongs to this genus was collected from ponderosa pine in 1937 (Hopk.U.S. 31501-M-8).

Additional material of this family on which no returns have yet been received or which have not yet been sent in for determination are listed below under their Hopk.U.S. numbers or collection numbers:

31507-S-23 to 32 incl. 31508-S-24 to 30 incl.
31544-S-6
-7 31548-L
-8 31547-L
46 NSV -L-1
46a NSV
46b NSV (Omaliinae) 179 EM
74 NSV

Histeridae

Teretrius sp. A single specimen was secured from a limber pine attacked the year before. (Hopk.U.S. 31507-S-15).

Platysoma punctigerum Lec. This is a fairly common beetle especially in the galleries of the Black Hills beetle in ponderosa pine. It was also collected occasionally from limber pine but not lodgepole pine. (Hopk.U.S. 31501-L-8, 31501-L-9, 31507-S-13; 11 NSV).

Isolomalus mancus Csy. Only a few specimens of this species were collected, all from limber pine. (Hopk.U.S. 31507-S-14, 31547-K-1, 31547-K-2).

Plegaderus obesus Csy. This is a fairly common beetle in ponderosa pine. Only a few were secured from limber pine and more from lodgepole pine. (Hopk.U.S. 31501-L-11, 31547-K-2; 11 NSV, 10 EM, 181 EM). A beetle from ponderosa pine that is probably this species has been determined as Plegaderus sp. (Hopk.U.S. 31501-L-10).

An undetermined histerid was secured from lodgepole pine and from limber pine. (Hopk.U.S. 31508-S-14; 181 EM).

Cantharidae

Podabrus sp. This genus was secured only from the limber pine cages and only in the adult stage. (Hopk.U.S. 31507-S-11, 31507-S-12).

Cantharis sp. Larvae of this genus were rather uncommon in ponderosa pine and no adults were secured. It is possible the larva migrates to the base of the tree or the soil around it previous to pupation. Members of this genus were also secured from limber and lodgepole pine also only in the larval stage. (Hopk.U.S. 31501-P-24, 31508-U-24).

Malthodes sp. Only a single adult was secured from ponderosa pine. (Hopk.U.S. 31501-N-9).

Cantharid larvae as yet undetermined were secured from ponderosa and lodgepole pine in 1938. (Hopk.U.S. 31548-M-8; 28 NSV, 57a-NSV).

Melyridae

Malachius sp. This genus is represented only by larvae collected from ponderosa and limber pine. As with Cantharis it is possible that no adults were secured because either pupation occurs at the base of the tree or in the soil around the base. For ponderosa pine larvae were secured only in August, while for limber pine during July and August. (Hopk.U.S. 31501-P-19, 31501-P-20, 31501-Q-6, 31507-U-2).

Attalus sp. A single adult was secured from ponderosa pine the latter part of July. (Hopk.U.S. 31501-L-15).

Trichochrous sp. Members of this genus were secured from all three host trees. They were collected in June and August--limber and lodgepole pine, and August--ponderosa pine. (Hopk.U.S. 31501-L-14, 31507-S-21, 31508-S-21).

Melyrid larvaefor which no generic determination has been secured were collected from ponderosa pine and limber pine. (Hopk. U.S. 31501-P-17, 31501-P-18, 31501-Q-2; 54a WK; 121a EM).

Cleridae

Thanasimus undatulus (Say). This is the most common clerid associated with the beetle in lodgepole and limber pine. Adults were secured chiefly during July and August. (Hopk.U.S. 31507-D and 31508-D).

Thanasimus undatulus var. nubilis Klug. Only three adults were secured. All three were collected late in August from a lodgepole pine. (Hopk.U.S. 31548-M-4, 31548-M-5).

Enoclerus lecontei (Wolc.) Only a few adults were secured from ponderosa pine in 1937 but in limber pine they were quite common. A pair were observed mating August 8, 1938, on a ponderosa pine dead one year. None was secured from lodgepole pine. (Hopk.U.S. 31501-N-11, 31507-S-16; 57 NSV).

Enoclerus sphegeus Fab. Although records show this beetle only from lodgepole pine and limber pine it has been observed on infested ponderosa pine. Only one adult was secured from Elk Mountain. This is probably because the larvae migrate to the base of the tree to pupate. Pupae that were believed to be this species were collected in the duff on August 24, 1937. (Hopk.U.S. 31507-S-16a, 31507-U-24).

Enoclerus moestus Klug? A larva of what appears to be this species was collected from lodgepole pine. Additional larvae belonging to this family were secured from the tree cages on lodgepole pine and ponderosa pine. They were fairly common from the latter tree. (Hopk.U.S. 31501-P-21, 31508-U-3, 31508-U-32a, 31508-U-32b; 13 NSV; 25 WK).

Othniidae

Othnius sp. Adults and larvae belonging to this genus were quite commonly secured from ponderosa pine; the larvae were much more abundant, 501 being secured from 84 square feet. They were about equally numerous all summer long. It seems likely that they migrate to the base of the tree to pupate. The beetle was not common at Elk Mountain, being collected only from lodgepole pine in the larval stage. (Hopk. U.S. 31501-P-2, 31501-L-18, 31508-U-28; 7 EM, 6 NSV).

Pyrochroidae

Schizotus sp? Adults and several pupae were secured from lodgepole pine. The pupae were collected from the collection jars in July. Three adults were secured late in July from limber pine. Material in alcohol is desired in Washington. (Hopk.U.S. 31507-H, 31508-H, 31508-H-1, 31508-J, 31508-U-22, 31508-U-23, 31548-K-3).

Anthicidae

Anthicus sp. Only a single specimen, in the larval stage, was secured. It was collected from ponderosa pine. (Hopk.U.S. 31501-Q-3).

Two larvae belonging in this family were collected from lodgepole pine. (Hopk.U.S. 31508-U-9).

Euglenidae

Cnopus sp. This genus is represented only by a single specimen collected from ponderosa pine. (Hopk.U.S. 31501-L-7).

Elateridae

Athous sp. This species was collected the latter part of July from limber pine attacked the year previous. (Hopk.U.S. 31507-R).

Undetermined elaterids under the following numbers were collected from ponderosa pine attacked the year previous: Hopk.U.S. 31544-T, 31544-T-1, 31544-T-2, 31544-T-3, 31546-M-9a).

Dermestidae

Perimegatoma sp. A single adult was collected from a ponderosa pine dead one year. (Hopk.U.S. 31501-N-8).

Trogoderma sp. Larvae of what is this or Anthrenus sp. were secured from limber pine in 1937. (Hopk.U.S. 31507-U-9).

Undetermined adults from ponderosa and limber pine are under the numbers Hopk.U.S. 31544-T-4, 31547-M-12, 31547-M-13.

Ostomatidae

Corticotomus caviceps (Fall). Adults, which can be found all season long, are rather common in ponderosa pine. (Hopk.U.S. 31501-N-23; 25 NSV, 69 NSV).

Temnochila virescens var. chlorodia (Mann.) This beetle is not a very common species in ponderosa pine. None was found in limber or lodgepole pine. (121 WK, 121a WK, 61 NSV).

Tenebroides occidentalis Fall. This species is about as common in ponderosa pine as Temnochila. No specimens were secured from the tree cages on lodgepole or limber pine, although a single specimen was secured on a limber pine attacked two years before. (Hopk.U.S. 31501-N-26, 31501-P-18, 31516-Y; 66 NSV).

Nitidulidae

Epurea sp. This is one of the most common insects generally secured from limber and lodgepole pine and a fairly common insect in ponderosa pine. Both the larval and adult stages were collected all season long. (Hopk.U.S. 31501-M-1, 31501-P-4, 31501-P-4a, 31507-S, 31507-S-5, 31507-S-20, 31508-S-20; 15 NSV). Larvae determined as E. linearis were also secured from limber pine (Hopk.U.S. 31507-U-25).

Lobiopa sp? A larva determined as possibly this species was secured from lodgepole pine. (Hopk.U.S. 31508-U-19b).

Soronia guttulata (Lec.) A few specimens of this species were secured du[illegible] July and August from ponderosa pine cages. (Hopk.U.S. 31501-N-2, 31544-R-11; 31 NSV).

Pityophagus. A single specimen was secured in July from an infested ponderosa pine. (Hopk.U.S. 31544-R-8).

Glischrochilus cylindricus (Lec.) Although not found generally in the ponderosa pine tree cages it was fairly common when secured. (Hopk.U.S. 31501-N-16; 27 NSV).

Orthopeplus quadricollis Horn. A few specimens were collected from ponderosa pine d ad one year. More specimens are wanted by the National Museum. (Hopk.U.S. 31544-R-7).

Nitidulidae? Undetermined specimens are under the following numbers: Hopk.U.S. 31507-S-19, 31546-M-6; 176 WK, 58 NSV).

Rhizophagidae

Rhizophagus dimidiatus Mann. Adults and larvae were very common all season long in the tree cages on limber and lodgepole pine but rather uncommon in ponderosa pine. (Hopk.U.S. 17751-A-16, 31501-N-21, 31507-I, 31508-I, 31508-U-19a, 31508-U-35a, 31544-S-1, 31547-K-5; 8a WK, 41 NSV, 77 NSV).

Monotomidae

Hesperobaenus. A few specimens of what is probably this genus were secured from ponderosa pine in 1938. (Hopk.U.S. 31544-R-6).

Leptipsius. Adults were secured from ponderosa pine late in August; only three specimens were secured. (Hopk.U.S. 31501-L-19).

Cucujidae

Cucujus clavipes var. puniceus Mann. No specimens have been collected from any of the tree cages on any of the three host trees. A single adult was secured in October 1938 on a ponderosa pine killed the previous year. (Hopk.U.S. 31540-A).

Laemophloeus angustulus Lec. Adults were not very common in the tree cages on lodgepole and limber pine. They were collected during August. A representative of this genus was also present but uncommon pon ponderosa pine. (Hopk.U.S. 31501-N-6, 31507-B, 31508-B, 31508-C; 66a NSV, 92 NSV, 104 NK).

Dendrophagus cygnaei Mann. A single adult was collected in September from a limber pine attacked the year previous and one in August from lodgepole pine attacked two years previous. (Hopk.U.S. 31507-S-39, 31548-M-8).

Cryptophagidae

Cryptophagus sp. A few adults were secured during July, August, and September from lodgepole and limber pine. (Hopk.U.S. 31507-S-17, 31507-S-18, 31507-S-18a, 31508-S-17, 31508-S18, 31508-S-19).

Another member of this family was secured from lodgepole pine the fore part of August. (Hopk.U.S. 31548-K-2).

Atomaria sp. A single adult was secured in August from a limber pine attacked two years previous. (Hopk.U.S. 31507-S-17a).

Caenoscelis ochreosa Csy. A single adult was secured from ponderosa pine. (Hopk.U.S. 31501-L-4).

Colydiidae

Lasconotus complex Lec. A single adult was secured in October from a limber pine attacked the year before. Two specimens that appear to be the same species were secured from lodgepole pine in July and August and another from limber pine in July. (Hopk.U.S. 31507-S-35, 31508-S-33, 31547-M-9).

Lasconotus tuberculatus Kraus. This is a fairly common species in ponderosa pine and can be found from the time the tree is first attacked to at least a year later. (Hopk.U.S. 31501-N-1; 29 NSV).

Lasconotus intricatus Kr. A few specimens were secured from lodgepole and limber pine. (Hopk.U.S. 31507-S-33, 31508-S-31, 31548-M-7).

Lasconotus simplex Lec. Only a single adult was secured in September from lodgepole pine. In ponderosa pine it was somewhat more common and most were collected in September and October. (Hopk.U.S. 31501-N-2, 31508-S-32, 31544-S-2; 29a, 29s NSV).

Lasconotus subcostulatus Kr. This species is represented by only a single specimen from limber pine collected in September (Hopk.U.S. 31507-S-34).

Lasconotus laqueatus Lec. Ponderosa pine is the only one of the three host trees rom which this beetle was collected. Three specimens were secured. (Hopk.U.S. 31501-N-3).

Lasconotus sp. Larvae that most probably belong to this genus were collected from lodgepole and ponderosa pines. (Hopk.U.S. 31501-Q-1a-g, 31508-U-6; 3a WK).

Aulonium longum Lec. Adults were secured only from limber and ponderosa pines. It is more common in ponderosa pine. Larvae were also secured from lodgepole pine. (Hopk.U.S. 31501-L-15, 31501-P-1, 31507-S-40, 31508-S-27, 31544-S-3).

Colydium sp. This apparently undescribed species was found only in ponderosa pine. It was not common. (Hopk.U.S. 31501-N-25, 31544-R-13, 31546-M-5; 69 NSV, 69a NSV).

Bothrideres montanus Horn. A single adult was secured August 30, 1937 from a ponderosa pine. (Hopk.U.S. 31501-N-4).

Lathridiidae

Enicmus tenuicornis Lec. An adult was secured the latter part of July from a ponderosa pine. Two additional specimens of what are probably this species were secured in July and August of the following year also from ponderosa pine. (Hopk.U.S. 31501-L-5, 31544-R-12, 31546-M-4).

Corticaria elongata Gyll. This is a rather common species in ponderosa pine. Specimens determined as belonging to this genus were also secured from limber and lodgepole pine but not as commonly. (Hopk.U.S. 31501-M-3, 31507-A, 31508-A; 10 NSV).

Undetermined material from lodgepole and ponderosa pine belonging in this family is under Hopk.U.S. 31548-K-2 and 95 EM.

Coccinellidae

Cleis picta (Rand). Adults were secured from ponderosa pine; one in July from an infested tree and two from a check cage on an uninfested tree. These beetles no doubt crawled into the bark merely to pupate. (Hopk.U.S. 31501-N-5).

Three undetermined adults from limber pine are under the numbers 31507-S-45, 31547-M-14, and 31547-M-15; a larva from ponderosa pine is under the number 22a NSV, and one from limber pine under the number 165a EM.

Tenebrionidae

Blaps? A few specimens of possibly this genus were reared from limber pine. (Hopk.U.S. 31507-S-8).

Tribolium madens (Charp.) Adults have been secured chiefly from ponderosa pine and some from limber pine. They were not common in either host tree. (Hopk.U.S. 31501-L-17, 31544-S-5, 31546-M-1, 31547-K-8, 31547-K-4).

Corticeus substriatus Lec. This species has been collected from limber pine and lodgepole pine and probably from ponderosa pine. As this is a very difficult group to work and there appear to be three or four species in it no critical separation has been made until the group has been worked over in Washington. Specimens are listed under the following Hopkins U.S. numbers:

Ponderosa pine	Lodgepole pine	Limber pine
17751-B-3	31508-M	31507-K
17751-B-4	31508-N	31507-L
31501-L-2	31508-O	31507-M
2 WK	31508-P	31507-N
2a WK		31547-M
2 NSV		31547-M-1
		31547-M-2
		31547-M-3
		31547-M-4
		31547-M-5
		31547-M-6
		31526-G

Corticeus occidentalis. A few specimens that are probably this species were secured from lodgepole and limber pine. (Hopk.U.S. 31507-O, 31508-P, 31508-Q, 31508-R).

Corticeus. Six specimens which appear to be new species were secured from ponderosa during the past two years. (Hopk.U.S. 31501-L-3, 31544-R-14).

Corticeus larvae were fairly common especially in ponderosa pine. (Hopk.U.S. 31508-U-29; 32 WK, 43 WK).

Bius estriatus Lec. This insect was not very common in ponderosa pine. What appears to be this species was also secured from limber and lodgepole pine. (Hopk.U.S. 31501-N-22, 31507-S-10, 31508-S-12, 31547-M-7, 31548-M-3; 4b WK, 40 NSV, 56 NSV).

Lagriinae? A larva apparently belonging to this subfamily was secured from limber pine. (Hopk.U.S. 31507-U-22).

Two undetermined tenebrionids are under the Hopkins U.S. numbers 31507-U-15 and 31544-R-9.

Melandyidae

Xylita laevigata Hal. Adults, although not very common, were secured from all three host trees. (Hopk.U.S. 31507-J, 31508-L, 31546-M-9, 31548-M).

Xylita? A few specimens distinct from X. laevigata were secured during July and August from ponderosa pine. (Hopk.U.S. 31544-S).

Canifera sp. A single adult was secured from ponderosa pine in August. (Hopk.U.S. 31501-M-2).

An undetermined specimen is under the number 35 NSV.

Ptinidae

Ptinus. A single adult was secured the latter part of August from limber pine. (Hopk.U.S. 31547-M-10).

Anobiidae

Utobium. Larvae, pupae, and callow adults were collected in September from uncaged lodgepole pines dead at least two years. Pupation occurs head out in a horizontal hole extending a short distance into the wood. The entrance hole is plugged with frass. (Hopk.U.S. 31517-M).

Ernobius sp. Two adults were secured in August and October from lodgepole pine. (Hopk.U.S. 31508-K).

Cisidae

Cis? Undetermined adults from limber pine are under the Hopkins U.S. numbers 31547-K-6 and 31547-N-6.

An adult (the genus to which it belongs is uncertain) was secured from ponderosa pine. (Hopk.U.S. 31501-L-6).

Cerambycidae

Asemum atrum Esch. Adults were secured from limber and ponderosa pine killed the year previous, and from lodgepole pine killed one and two years previous. (Hopk.U.S. 17751-B-14, 81 NSV).

Nothorhina aspera Lec. A single adult was secured in August from a limber pine killed two years previous. What appears to be the same species was secured from ponderosa pine killed the year previous. (Hopk.U.S. 31507-S-44 and 31544-T-2).

Tetropium parallelum Csy. Specimens were secured only from ponderosa pine killed the year previous. (Hopk.U.S. 31501-L-1; 33 NSV, 83 NSV, 148a EM).

Oeme subobsoleta Csy. Three adults were collected early in August from lodgepole pine killed the year previous. (Hopk.U.S. 31517-I).

Stenocorus lineatus (Oliv.) Adults have been collected on the bark of infested ponderosa pine. (Hopk.U.S. 17702-W, 31412-R).

Gaurotes sp.? Larvae that may belong to this genus were rather commonly found in the collection jars on limber pine. No adults, however, have been secured. (Hopk.U.S. 31508-U-10, 31508-U-11, 31508-U-11a; 39 EM).

Phymatodes dimidiatus (Kirby). Three pairs were observed late in August on the bark of a limber pine killed the year previous. (Hopk.U.S. 31526).

Neoclytus muricatulus. A single adult was secured early in August from a ponderosa pine attacked the year previous. (Hopk.U.S. 31544-S-9).

Monochamus maculosus. A few adults were secured from ponderosa pine dead two years. (Hopk.U.S. 31546-M-7).

Monochamus scutellatus. On July 22, 1938, two adults were observed just boring out of a lodgepole pine killed two years before. Oviposition was observed on lodgepole pine the middle of August. Adults have also been collected from limber pine logs. (Hopk.U.S. 31517-L, 31520-A).

Acanthocinus obliquus (Lec.). Adults have been collected during July from limber pine killed one and two years previous; from ponderosa pine in August killed a year previous, and from lodgepole pine in July killed two years previous. (Hopk.U.S. 31501-N-10, 31507-S-43).

Acanthocinus spectabilis Lec. A few adults were collected from ponderosa pine killed the year previous. (75 NSV).

Pogonocherus propinquus Fall. This is another species of which only a single specimen was secured. It was secured the middle of September from a limber pine killed the year previous. (Hopk.U.S. 31507-S-42).

Pogonocherus pictus Fall. A single adult was collected in mid-August from limber pine attacked the year previous. (Hopk.U.S. 31507-S-41).

Pogonocherus mixtus Hald. Only a single adult was secured, in mid-August, from a ponderosa pine killed the year before. (Hopk.U.S. 31501-N-10).

Chrysomelidae

Syneta sp. A single adult was secured the latter part of June from a lodgepole pine attacked three years previous. (Hopk.U.S. 31508-S-13).

Cryptocephalinae. A few larvae of this interesting form were secured from limber pine and one from ponderosa pine. The larvae are found each in a cell which is apparently made up of cast larval skins. (Hopk.U.S. 31507-U-13; 22a NSV).

Glyptina cerina Lec.? Only a single adult was secured from lodgepole pine. (Hopk.U.S. 31508-S-15).

Phyllotreta sp. A few specimens were secured from the ponderosa pine cages and also lodgepole and limber pine. (Hopk.U.S. 31501-L-12, 31544-R-10; 20 NSV, 105 EM).

Luperodes? Only one larva of this interesting form was secured, from lodgepole pine. The U. S. National Museum has requested that it be reared if possible. (Hopk.U.S. 31508-U-4).

An undetermined larva and adult are under the numbers 56a MK and 145 EM.

Bruchidae

Bruchus? A single adult was collected from lodgepole pine. (Hopk.U.S. 31548-K).

Curculionidae

Pissodes. A single adult was secured the end of July from a limber pine attacked two years previous. (Hopk.U.S. 31547-M-11).

Magdalis. Only one specimen was secured from ponderosa pine attacked the year previous. It was collected the latter part of July. (Hopk.U.S. 31544-R-4).

Gelus californicus (Lec.) Adults were secured only from ponderosa pine. All but one were collected the year following the death of the tree; the exception was collected from a tree dead two years. (Hopk.U.S. 31501-N-14, 31544-R-2, 31546-M-2).

Cylindrocopturus. This species was secured only from ponderosa pine both one and two years after it had been attacked by the Black Hills beetle. (Hopk.U.S. 31544-R-3, 31546-M-3).

Rhyncolus spp. At least two species appear to be present in the collections made from the three host trees. They were secured from trees dead one, two, and three years from the date of collection. (Hopk.U.S. 31501-L-16, 31507-C, 31544-R-5, 31546-M-8, 31547-M-8, 31547-M-16, 31548-M-8).

Curculionids. Undetermined specimens are under the Hopkins U.S. numbers 31544-R and 31544-R-1.

Scolytidae

Crypturgus borealis. A few specimens were collected from a limber pine killed the year previous, and two additional adults were collected from the roots of a ponderosa pine dead one year. (Hopk.U.S. 31507-Q-3, 31543-I-1).

Carphoborus sp. Two adults were collected from two cages on limber pine on trees dead one year. (Hopk.U.S. 31507-S-5).

Hylurgops rugipennis (Mann.) Several specimens were secured from both lodgepole and limber pine attacked the year previous. (Hopk. U.S. 31507-S-7, 31508-S-11, 31547-N). Two specimens that are probably this species but which appear somewhat distinct were also secured from lodgepole and limber pine. (Hopk.U.S. 31547-N-1, 31548-N-2).

Hylurgops porosus (Lec.) Adults were collected from all three host trees the year following attack by the primary beetle. (Hopk.U.S. 31501-N-17, 31507-S-4, 31508-S-9, 31544-U-3, 31547-N-2, 31547-N-3, 31548-N-3). Dr. Blackman considers H. lecontei, which has also been collected from the same localities, to be at most a variety of porosus.

Hylurgops subcostulatus (Mann.) Adults were very common, all season long, in the ponderosa pine cages on trees dead one year. (Hopk. U.S. 31501-N-20; 7 NSV).

Hylastes longus Lec. A few specimens were secured from ponderosa pine dead one year. (Hopk.U.S. 31544-U-3; 98a EM).

Hylastes macer Lec. A single adult was secured early in July from ponderosa pine. (Hopk.U.S. 31544-U-2).

Trypodendron rufitarsis. A few adults were secured from limber pine dead one and two years. (Hopk.U.S. 31547-N-4).

Gnathotrichus denticulatus Blkm. Adults were secured only from ponderosa pine in trees dead one and two years. (Hopk.U.S. 31501-N-19, 31544-U-4).

Gnathotrichus aciculatus Blkm. A few specimens were secured from ponderosa pine dead one and two years. (Hopk.U.S. 31501-N-18).

Pityophthorus caelator Blkm. This species was collected from all three host trees. This is a new host record for lodgepole and limber pines. (Hopk.U.S. 31501-N-28, 31501-N-29, 31501-N-31, 31507-S-2, 31508-S-1).

Pityophthorus near venustus Blkm. Adults were collected only from ponderosa pine. (Hopk.U.S. 31501-N-28).

Pityophthorus crassus Blkm. This species was collected only from ponderosa pine. (Hopk.U.S. 31501-N-32).

Pityophthorus near solers Blkm. Ponderosa pine was the only host from which this beetle was collected. (Hopk.U.S. 31501-N-30).

Pityophthorus murrayanae Blkm. Adults were fairly common in the lodgepole and limber pine cages. This is a new host record from limber pine. (Hopk.U.S. 31507-S-1, 31508-S-1, 31508-S-3, and 31508-S-4).

Pityophthorus. Undetermined material is under the following Hopkins U.S. numbers: 31508-S-2, 31544-U, 31547-N-5, 31548-N-5, 31548-N-6.

Pityogenes fossifrons (Lec.) A few adults were secured from lodgepole and limber pine. It is a common species in limber pine limbs. (Hopk.U.S. 31507-C, 31508-C, 31548-N-7).

Pityogenes carinulatus (Lec.) Adults were collected only from ponderosa pine. (Hopk.U.S. 31501-N-2; 28 NSV).

Pityogenes knechteli Sw. This secured in only a few cases from both lodgepole and limber pine. The occurrence in limber pine is apparently a new host record. (Hopk.U.S. 31507-S-1, 31508-S-6).

Ips radiatae Hopk. Only a single adult was collected from a lodgepole pine attacked two years previous. (Hopk.U.S. 31548-N).

Ips knausi Sw. This is one of the most common scolytids--filling in uninfested portions of ponderosa pines attacked by the Black Hills beetle. (Hopk.U.S. 31501-N-3; 37 NSV).

Ips guildi Blkm. A few adults were secured from lodgepole and limber pine dead one and two years. This is a new host record for limber pine. (Hopk.U.S. 31507-S-6, 31508-S-10).

Ips integer (Eich.) Adults are quite common in limber pine at times even attacking and killing healthy trees. This is a new host record for this tree. It was also collected from lodgepole and ponderosa pine. (Hopk.U.S. 31507-S-2, 31508-S-7, 31548-N-1; 34 MK, 48 NSV).

Ips oregoni (Eich.) A single adult was secured from ponderosa pine. (48a NSV).

Pityokteines minutus Sw. Adults were secured from lodgepole and limber pine cages. This is a new host record for these two trees. (Hopk.U.S. 31507-S-3, 31508-S-8; 31548-N-4 is also probably this species).

Orthotomicus ornatus Sw. This is one of the most common scolytids collected from ponderosa pine. (Hopk.U.S. 31544-U-1; 5 MK).

Xyleborus scopulorum Hopk. A few adults were secured from ponderosa pine dead one year. (Hopk.U.S. 31501-N-27, 31544-U-5).

Undetermined Coleoptera

Family uncertain or not known.

Adults: Hopk.U.S. 31544-S-4, 31544-S-10; 98a NSV

Larvae: 55 NSV

HYMENOPTERA

Xyelidae

Xyela near brunniceps Rohwer. A single adult and a larva were collected from lodgepole pine the latter part of June. (Hopk.U.S. 31508-T-36, 31508-U-37).

Diprionidae

Neodiprion. Numerous larvae were secured from lodgepole and limber pine, and a few adults from limber pine (Hopk.U.S. 31507-U-4, 31508-U-8, 31548-I; 112a EM).

Braconidae

Atanycolus. A single adult was collected from ponderosa dead a year. (Hopk.U.S. 31501-B).

Coeloides scolyti Cush. Three adults were collected the latter part of July from ponderosa pine dead one year. (Hopk.U.S. 31501-F).

Coeloides dendroctoni Cush. Adults were common in both lodgepole and limber pine. They appear to be the most common parasite of the Black Hills beetle. (Hopk.U.S. 31507-T-22, 31508-T-29).

Meteorus hypophloei Cush. This parasite of Corticeus was collected only from lodgepole and limber pine in July, August, and September. It was not very common. (Hopk.U.S. 31507-T-23, 31508-T-30, 31547-I-3, 31548-I-3).

Cosmophorus sp. A few adults were collected in August from lodgepole pine dead one year. Records of other species show this genus to be parasitic on adult Pityophthorus, Dendroctonus, and other scolytids. (Hopk.U.S. 31508-T-24, 31508-T-31).

Echyphus sp. This parasite was collected from ponderosa pine dead one year. What is probably this genus was also collected from limber pine. (Hopk.U.S. 31501-I-5, 31547-I-4, 31547-I-5).

Deuteroxorides borealis (Cress.) A single male was collected the early part of August from a ponderosa pine killed the year previous. (Hopk.U.S. 31501-I-5).

Braconidae--specimens under the following numbers have not yet been determined:

Hopk.U.S. 31546-C (apterous)
31547-I-2 (apterous)
31548-I-1
31548-I-2
51 WK (larva)
99 WK (larva)

Ichneumonidae

Phaeogenes sp. A single adult that may be spinotiae Cush. was secured the middle of July from lodgepole pine dead two years. Four more adults representing 5 new species were collected from ponderosa pine dead one year. (Hopk.U.S. 31501-E-1, 31508-T-35).

Lissonota n. sp. Four adults were collected during August and September from lodgepole pine dead one and two years. (Hopk.U.S. 31508-T-38).

Undetermined ichneumonids are under the numbers:

Hopk.U.S. 31544-C
31546-D
31547-I
31547-I-1

49 NSV

Stephanidae

Schlettererius? A single adult that apparently belongs here was collected the latter part of August from limber pine killed one year previous. (Hopk.U.S. 31547-I-7).

Diapriidae

Xenotoma sp. A single adult was collected the latter part of August from limber pine dead one year. (Hopk.U.S. 31507-T-20).

Spilomicrus sp. Fourteen specimens that are placed near this genus were collected from limber pine. (Hopk.U.S. 31507-T-18).

Cersphronidae

Conostigmus sp.? A single adult was collected the latter part of September from lodgepole pine killed the year previous. (Hopk.U.S. 31508-T-27).

Aphanogmus sp. Two adults were collected--one from lodgepole pine early in August and one from ponderosa pine late in July--from trees dead one year. (Hopk.U.S. 31501-I-10, 31508-T-8).

Serphidae

Basinae. A single adult was collected from a limber pine killed the year previous. (Hopk.U.S. 31507-T-25).

Undetermined diapriids and serphids are under the following Hopk. U.S. numbers: 31544-J, 31544-M, 31544-N, 31544-O, 31547, 31547-F, 31547-F-1, 31547-F-2, 31547-F-3; 180 BM.

Scelionidae

Telenomus sp. A few adults were collected from lodgepole and limber pine chiefly in August. (Hopk.U.S. 31507-T-21, 31508-T-32). Specimens that appear to belong to this genus are under the numbers: Hopk.U.S. 31544-L, 31547-G.

Platygasteridae

Leptacis sp. This is not a common species. It occurred only in ponderosa pine. (Hopk.U.S. 31501-I-2; 24 NSV).

Cynipidae

Melanips sp. A single adult was collected from lodgepole pine dead a year. (Hopk.U.S. 31508-T-25).

Eucharidae

Pseudochalcura? Three specimens were collected the latter part of August and September from ponderosa pine killed the year previous. (Hopk.U.S. 31544-P, 31546-I; 173 WK).

Callimomidae

Torymus? A single female was collected from a lodgepole pine killed the year before. (Hopk.U.S. 31548-H-2).

Eurytomidae

Eurytoma n. sp. A single adult was collected the first week in August from a lodgepole pine dead two years. (Hopk.U.S. 31508-T-34).

Encyrtidae

Copidosoma bakeri (How.) This species was collected chiefly in August from the tree cages on both lodgepole and limber pine. It was not common. (Hopk.U.S. 31507-T-24, 31508-T-32).

Copidosoma sp. Three adults were collected from ponderosa pine dead a year. (Hopk.U.S. 31501-I-1).

Miscogasteridae

Tridymus sp. A single specimen was collected the middle of August from a ponderosa pine killed the year before. (Hopk.U.S. 31501-I-3).

Eupelmidae?

Arachnophaga sp. A single specimen was collected the end of July from a ponderosa pine killed the year previous. (Hopk.U.S. 31501-I-4).

Pteromalidae

Dibrachys cavus (Walk.) Fifteen adults were secured during July and August from a ponderosa pine killed the previous year. (Hopk.U.S. 31501-I-8, 31501-I-9, 31501-A-4).

Pachyceras eccoptogastri Ratz. Adults are not uncommon on all three host trees dead from one to two years. They are parasites of the larval stage ~~of the Black Hills beetle~~ and other scolytids. (Hopk.U.S. 31501-A, 31501-A-1, 31501-A-2, 31501-A-3, 31507-T-19, 31507-T-19a, 31507-T-20, 31508-T-26, 31508-T-26a, 31508-T-26c, 31508-T-26d, 31544-H, 31547-H-2, 31548-F; 32 NSV).

Cecidostiba burkei Cwfd. A few adults were collected from ponderosa pine dead a year. (Hopk.U.S. 31501-I-6, 31501-I-7). What is probably the same species was collected from lodgepole and limber pine dead two years. (Hopk.U.S. 31547-H-7, 31548-G /No Hopkins card for this number/.).

Amblymerus sp. Four specimens were secured during July and August from limber pine dead one and two years. (Hopk.U.S. 31507-T-12, 31507-T-13, 31507-T-14).

Pachycrepoideus. Two adults were collected on the last of July from limber pine and one the first part of August from lodgepole pine. Both trees were killed the year before. (Hopk.U.S. 31507-T-15, 31507-T-16).

Tritneptis diprionis Gahan. Three adults were collected in July and August from lodgepole pine killed the year previous. (Hopk.U.S. 31508-T-21, 31508-T-22, 31508-T-23).

Tritneptis klugii Ratz. Two adults were collected the first half of August, one from lodgepole pine and one from limber pine. Both trees were dead one year. (Hopk.U.S. 31507-T-17, 31508-T-20).

Tritneptis sp. A single adult was collected the middle of July from a limber pine dead three years. (Hopk.U.S. 31508-T-26b).

An undeterminable genus is under the Hopk.U.S. number 31508-T-33.

Elasmidae

A specimen probably belonging to this genus was collected from ponderosa pine killed the year previous. (72 NSV).

Undetermined chalcids are under the numbers:

48a EM
100a EM
Hopk.U.S. 31507-U-5 (larva)
31544-I
31546-J (in too poor shape to determine)
31546-K
31547-G
31547-H-1 to -H-6 incl.
31548-C-1 to -3 incl.
31548-H
31548-H-1

Psammocharidae

Pseudogenia architecta (Say). Two adults have been collected from ponderosa pine dead one year. One specimen was collected July 28, the other August 16. (Hopk.U.S. 31501-D, 31544-K).

Chrysididae

Chrysis (Tetrachrysis) sp. Two adults were collected from ponderosa pine killed the year previous. (Hopk.U.S. 31501-H, 31544-F).

Formicidae

Ants were collected from the cages on all of the three host trees. Some no doubt entered through crevices under the cage binding but others may have entered through beetle galleries. The following ants have been determined. Undetermined ones are listed under their collection numbers:

Ponderosa pine

	Hopkins U.S. No.
Myrmica sp. (scabrinodis group)	31501-G-2
Myrmica sp.	31501-G-4
Tapinoma sessile (Say)	31501-G-7
Lasius (Acanthomyops) latipes Walsh	31501-G-1
Lasius niger var. alienus Forel.	31501-G-5
	31501-G-6
Lasius sp.	31501-G-8
Formica fusca var. subsericea Emery	31501-G-?
Formica sanguinea subsp. subnuda Emery	31501-G-9

Undetermined

24a to d incl. WK
12 to 13d incl. NSV

Lodgepole pine

Myrmica sp. Hopk.U.S. 31508-S-22b

Undetermined. 31508-S-22
31508-S-22a
31508-S-22b
31508-S-22c
31508-S-22f

Limber pine

Myrmica sp. (scabrinodis group). Hopk.U.S. 31507-S-22b

Undetermined. Hopk.U.S. 31507-S-22
31507-S-22c
31507-S-22d
31507-S-22e
31507-S-22f
31547-O-1
31547-O-2

Sphecidae

Passaloecus relativus (Fox). A few specimens have been secured from ponderosa pine dead one and two years. (Hopk.U.S. 31501-C, 31546-F, 31546-F-1). What appears to be the same species was collected from limber pine dead a year. (174 Em).

This genus utilizes beetle galleries in which to store aphids on which they rear their young. The orange-yellow larvae each in a separate cell one above another are frequently met with when examining infested and abandoned beetle-killed trees.

Undetermined sphecoid. A single adult was collected in July from ponderosa. (Hopk.U.S. 31546-H).

DIPTERA

Bibionidae

Bibio slossonae Cock. Adults were collected from all three host trees. Most of the adults from limber and lodgepole pine emerged from trees dead more than two years. Adults were observed mating the end of June on dead lodgepole pine. No larvae were collected from the tree cages. (Hopk.U.S. 31501-K-8, 31508, 31516-F, 31544-Q-2, 31547-J-2).

Bibio sp. A specimen that also belongs to this genus was collected from lodgepole pine dead several years. (Hopk.U.S. 31508-T-6).

Scatopsidae

Rhegmoclema atrata (Say). A single adult was collected the end of August from lodgepole pine dead one year. (Hopk.U.S. 31508-T-18).

Rhegmoclema sp. Adults have been collected from ponderosa pine dead one and two years. (Hopk.U.S. 31501-K-7, 31546-L).

Adults which apparently belong to this family were also collected from limber pine dead two years and ponderosa pine dead one year. (Hopk.U.S. 31544-Q-1; 61a Em).

Sciaridae

Sciara sp. Adults belonging to this genus were collected from all three host trees. They are under the following Hopkins U.S. collection numbers:

Ponderosa pine	Limber pine	Lodgepole pine
23 NSV	180 EM	Hopk.U.S. 31508-T-4
43 NSV	Hopk.U.S. 31507-T-4	Sciara fatigans Joh.
Hopk.U.S. 31501-K-1	31547-J-9	31508-T-4 Sciara
31501-K-2		coprophila Lint.
31501-K-5		31508-T-4 Sciara sp.
31546-L-6		

Mycetophilidae

Cordyla sp. Although adults were collected only from the tree cages on ponderosa and lodgepole pine it is probable that they also occur in limber pine. The material is under the following Hopkins U.S. numbers: 31501-K-5, 31501-K-13, 31508-T-1, 31508-T-2, 31508-T-4, 31508-T-10, 31546-L-8.

No larvae were secured either for this family or for the preceding one.

Ceratopogonidae

Dasyhelea sp. Adults were collected from ponderosa pine killed the year previous. (Hopk.U.S. 31501-K-6).

Cecidomyiidae

Several species of cecidomyiid were secured but only a few generic determinations could be secured. Many cecidomyiid larvae were also collected especially from ponderosa pine. These could be separated into at least two groups--those with striate cuticula of which over 600 were collected, and those with smooth cuticula and either whitish or pink, of which over 500 were collected from 80 square feet of bark surface. The trapping of so many larvae in the collection jars seems to indicate that pupation generally takes place in the duff. The material is under the following Hopkins U.S. collection numbers:

Striate larvae		Non-striate larvae		Adults	
	4 NSV		5 NSV		82 EM
Hopk.U.S.	31501-P-13	Hopk.U.S.	31501-P-12	Hopk.U.S.	31501-K-2
	31507-U-26		31501-P-15		31501-K-3 near *Thecodiplosus*
			31501-Q-4		31501-K-4 near *Winnertzia*
			31501-Q-5		31507-T-1
			31501-Q-8		31507-T-2
			31508-U-26		31507-T-3 *Lestremia* sp.
			31508-U-28		31508-T-3 *Lestremia* sp.
					31546-L-5
					31546-L-6
					31547-J-6
					31547-J-9
					31548-J

Stratiomyiidae

Zabrachia polita Coq. Adults and what are most probably the larvae were collected from all three host trees dead one and more years. They were not uncommon, the larvae being especially common in limber pine. Because of the number of larvae trapped in the collection jars it seems probable that pupation, in some cases at least, occurs in the ground. (Hopk.U.S. 31501-K-11, 31507-T-11, 31508-T-19, 31508-U-25, 31546-L-7; 73 NSV, 74 EK).

Coenomyiidae

Xylophagus fasciatus Walk. Two adults were collected, one June 29, the other August 25, from limber pine dead two years. What appear to be the larvae of this species were collected near the end of September from limber pine dead one year and from ponderosa pine dead two years. (Hopk.U.S. 31505-C, 31507-U-18, 31516-H, 31547-J-1; 122 EM).

Xylophagus decorus. An adult of what appears to be this species was collected as a pupa in limber pine July 20. It emerged July 22. (Hopk.U.S. 31547-J).

Scenopinidae

Several undetermined specimens that are tentatively placed in this family are under the following numbers:

Larvae	Adults
44 NSV	Hopk.U.S. 31546-L-1
Hopk.U.S. 31507-U-17 31508-U-36	

Therevidae

Psilocephala sp. A single adult was collected from lodgepole pine. (Hopk.U.S. 31508-U-21). An adult from limber pine that appears to belong to this family is under the Hopkins U.S. number 31547-L-3.

Cyrtidae

A single adult belonging to this family was collected from lodgepole pine dead two years. (Hopk.U.S. 31548-J-2).

Empididae

Tachypeza brachialis Mel. A single adult was collected August 13 from ponderosa pine dead one year. What appears to be the same species was collected in September from a ponderosa pine dead two years, two others from a ponderosa pine dead one year, and two others on a lodgepole pine killed the year previous. (Hopk.U.S. 31501-K-10, 31517-F, 31546-L-3; 84 NSV).

Drapetis dividua Mel. A single adult was collected August 16 from a ponderosa pine dead one year. (Hopk.U.S. 31501-K-10).

Dolichopodidae

Medetera aldrichii Wh. This is the most common predator reared from the tree cages on limber pine, close to 200 adults having emerged from 60 square feet of bark surface. Emergence occurs all season long but chiefly during the latter half of August and September from trees killed the year previous. A few emerge from trees dead two years but this is probably because of the hold-over broods of the beetle. No emergence occurred from trees dead three years. Emergence from lodgepole and ponderosa pine was considerably less than from limber pine. A few Medetera larvae were also collected from the tree cages. (Hopk. U.S. 31501-K-14, 31501-K-15, 31501-K-16, 31507-T-5, 31508-T-5, 31508-U-7, 31526-J).

Medetera sp. Material that is or appears to be distinct from aldrichii is under the following Hopkins U. S. numbers: 31507-T-5c, 31507-T-5b, 31546-L-2, 31547-J-14; 18 WK (pupae) 93 WK (larvae)

Undetermined dolichopods from limber and lodgepole pine are under the Hopkins U.S. numbers 31547-J-5, 31548-J-3.

Phoridae

Aenigmatias schwarzi Coq. A single adult was collected the latter part of August from a lodgepole pine attacked the year previous. (Hopk.U.S. 31508-U-31). This is considered to be a very interesting species and more are desired by the National Museum.

Hypocera sp. A single adult was collected from the same tree on the same date as the above species. (Hopk.U.S. 31508-T-7).

Megaselia sp. A few adults were collected from limber and lodgepole pine dead one year. (Hopk.U.S. 31507-T-8, 31507-T-8a, 31507-T-8b, 31508-T-11 to -T-17 incl.).

Material from ponderosa pine probably belonging in this group is under the Hopkins U.S. numbers: 31544-C, 31546-L-9; and 84a NSV

Syrphidae

A syrphid larva was collected from a ponderosa pine tree cage. (134 WK).

Otitidae

A very small nematode-like dipterous larva was collected in great numbers (over 500) from limber pine. A few were also collected from lodgepole pine. These were too immature but it is thought that they may belong in this family. (Hopk.U.S. 31508-U-20).

Adults that may be in this family are under the Hopkins U. S. numbers: 31544-C-4, 31546-L-4.

Lonchaeidae

Lonchaea sp. A few adults have been collected from limber pine dead one and two years and from ponderosa pine dead one year. (Hopk. U.S. 31501-K-12, 31507-T-6, 31507-T-11a, 31547-J-12).

Muscidae

Hylemia sp. A single adult was collected the middle of September from a ponderosa pine dead one year and from a lodgepole pine dead three years. (Hopk.U.S. 31501-K-9, 31508-T-8).

Anthomyinae. A single adult was collected from limber pine dead three years. (Hopk.U.S. 31507-T-10).

Tachinidae

Plectops sp. This tachinid was collected from lodgepole and limber pine dead one year. (Hopk.U.S. 31507-T-9, 31508-T-9).

An undetermined tachinid from limber pine is under the Hopkins U.S. number 31547-J-4.

Undetermined Diptera are under the following numbers:

Larvae	Adults
127a EM	Hopk.U.S. 31544-Q-3
83a NSV	31544-Q-5
	31544-Q-6
	31544-Q-7
	31544-Q-8
	31544-Q-9
	31544-Q-10
	31547-J-10
	31547-J-11
	31547-J-13
	31547-J-15
	31548-J-1

LEPIDOPTERA

Tenoidae

Larvae belonging to this family were collected from tree cages as follows:

Hopk.U.S. 31501-P-11	150a EM	Hopk.U.S. 31507-U-6*
		31507-U-10

*More of these are desired by Washington if adults and larvae can be secured.

Gelechiidae

A single larva belonging to this family was collected from a ponderosa pine cage. (Hopk.U.S. 31501-P-9).

Blastobasidae

A single adult belonging to this family was collected from a ponderosa pine cage. (Hopk.U.S. 31501-P-10).

Geometridae

Adults belonging to this family have been collected from ponderosa and limber pine cages. (Hopk.U.S. 31501-P-8, 31507-U-7, 31507-U-19).

Noctuidae

Larvae belonging to this family have been collected from limber and ponderosa pine cages. (Hopk.U.S. 31501-P-7, 31507-U-12).

Plutellidae

Ceretoma undulatella Busck. A single adult was collected August 13 from a ponderosa pine cage. (Hopk.U.S. 31501-K-17).

Undetermined Lepidoptera are under the following numbers:

Larvae	Adults
3 WK	44 WK
44 WK	43 BM
39 NSV	66 BM
50 NSV	
68 NSV	
43a BM	

Tables I, II, and III which follow are a partial summary of the data on the material collected from all the tree cages to date. Some of the beetles listed as being predacious may only be facultative predators, or may never be in a position where they can feed on the immature stages of the Black Hills beetle. Observations have shown, however, that either the larva or adult or both of any of the species listed will feed on some stage of the Black Hills beetle if the opportunity arises. Not all, but only the most common, parasites and predators are listed. The others are all grouped together with the other associated insects.

Table I.--Important parasites, predators, Black Hills beetles, and all other associated insects, per square foot, collected from tree cages placed on trees spring following attack by the Black Hills beetle.

Lodgepole Pine

	Year of Emergence									Totals for each year of attack							
	1935	1936	1937			1938				1934		1935		1936		1937	
										Total	No. per sq. ft.	Total	No. per sq. ft.	Total	No. per sq. ft.	Total	No. per sq. ft.
Year of Black Hills beetle attack	1934	1934	1935	1934	1935	1936	1934	1935	1936	1937							
Sq. ft. of tree cages	32	32	22	32	22	40	32	22	40	32		22		40			
Species																	
Rhizophagus	2	1	37	3	17	547			268	5	.15	54	2.4	815	20.4		
Epuraea			24		33	4						47	2.1	4	.1		
Coeloides	43	5	53	1	13	56			81	49	1.5	46	2.1	137	3.3		
Clerids	11	5	33			27			13	16	.5	33	2.1	40	1		
Medetera				1	3	45			21	1	.03	3	.01	66	.6		
Corticeus	17	2	23	3	8	192			36	22	.6	31	1.4	228	5.7		
Pachyceras	1		1			1			1	1	.03	1	.04	2	.05		
Totals	75	23	151	8	64	872			420	94	2.9	215	9.8	1292	32.3		
Black Hills beetle	584	11	1066		135	788			118	695	21.7	1078	49.0	906	22.6		
Total all associated insects other than those listed above	67	59	240	70	122	2045			774	196	6.1	362	16.4	2787	69.6		

Table II.--Important parasites, predators, Black Hills beetles, and all other associated insects, per square foot, collected from tree cages placed on trees spring following attack by the Black Hills beetle.

Limber pine

	Year of emergence										Totals for each year of attack							
	1935	1936	1937			1938					1934		1935		1936		1937	
											Total	No. per sq. ft.	Total	No. per sq. ft.	Total	No. per sq. ft.	Total	No. per sq. ft.
Year of Black Hills beetle attack	1934	1934	1935	1934	1935	1936	1934	1935	1936	1937								
Sq.ft.of tree cages	28	28	32	28	32	60	28	32	60	12	28		32		60		12	
Species																		
Rhizophagus	17	9	3	292	179	365			303		318	11.3	182	5.7	1368	22.9		
Lpurea		2	18			9			11	24	2	.07	13	.4	20	.3	24	2.0
Coeloides	2		2	1					9		3	.1	2	.07	9	.1		
Clerids	46		52		1	53			11	17	46	1.6	53	1.6	64	1.1	17	1.2
Medetera		3	5		92	138			54	7	3	.1	98	3.0	185	3.1	7	.6
Corticeus	42	18	110	3	61	563			231	63	63	2.2	171	5.3	794	13.2	63	5.1
Pachyceras						3			1						2	.03		
Totals	107	32	185	296	333	1325			1120	111	435	15.5	519	16.2	2442	40.7	111	9.2
Black Hills beetle	4606	271	2852	7	78	5745			83	794	4884	174.4	2930	91.5	5828	97.1	794	66.2
Totals all other insects	206	170	69	459	997	1659		120	1689	267	835	29.8	1186	37.1	3348	55.8	267	22.2

Table III. Important parasites, predators, Black Hills beetles, and all other associated insects per square foot, collected from tree cages placed on trees spring following attack by Black Hills beetles.

Ponderosa pine

	Year of Emergence			Totals for each year of attack			
	1937	1938		1936		1937	
				Total	No. per sq. ft.	Total	No. per sq. ft.
Year of Black Hills beetle attack	1936	1936	1937				
Sq. ft. of tree cages	80	80	40	80		40	
Species							
Othnius sp.	513	9	128	522	6.5	138	3.4
Plegaderus	113	8	58	121	1.5	58	1.4
Corticeus spp.	941	64	125	1005	12.6	125	3.1
Aulonium longum	769	19	77	788	9.8	77	1.9
Platysoma	8	0	126	8	.1	126	3.1
Epuraea sp.	5	5	44	10	.1	44	1.1
Clerids	98	0	209	98	1.2	209	5.2
Pachyceras	49	0	0	49	.6	0	0
Medetera sp.	24	4	1	28	.3	1	.02
Corticotomus	17	5	21	22	.3	21	.5
Rhizophagus	7	0	4	7	.1	4	.1
Tenuchila	2	0	12	2	.02	12	.3
Totals	2546	114	1653	2660	33.2	1653	41.3
Black Hills beetle	2240	0	838	2240	28	838	20.9
Total all other associated insects	3191	317	1166	3508	43.8	1166	29.1

A study of these three tables shows that the number of parasites and predators per square foot has increased each year except for limber pine in 1937 when there was a considerable drop. There also seems to be some correlation between the number of Black Hills beetles and parasites and predators per square foot, but whether this correlation is actual or only apparent cannot be told from the studies conducted so far. Table IV summarizes tables I, II, and III.

Table IV.--Insect emergence per square foot (Summary of Tables I, II, and III)

Insect	Ponderosa pine		Lodgepole pine			Limber pine			
	Year of attack								
	1936	1937	1934	1935	1936	1934	1935	1936	1937
Black Hills beetle	26	20.9	21.7	49.0	32.6	174.4	91.5	97.1	66.2
Important parasites and predators	33.2	41	2.9	9.8	32.3	15.5	16.2	40.7	9.2
All other insects	43.8	29.1	6.1	16.4	69.6	29.8	37.1	55.8	22.2